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AUTHOR Greenfield, Patricia
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ABSTRACT

In order to test the strengths of radio as a learning tool for children, research was conducted in which radio and television were compared in relation to their abilities to stimulate children's imaginations and to transmit information to children. The research involved a series of studies in which children were presented with two unfamiliar stories in both a radio and a television format. Each study involved 24 boys and 24 girls, in 2 age groups: 6 1/2 to 8 and 9 to 10 1/2 years. Studies included children from middle- and working-class white and black families. For the study of imagination, both the video and audio presentations were stopped prior to the ends of the stories and children were asked to complete them. As hypothesized, radio stimulated imagination more than did television, but this finding was most pronounced among white children. For the study of memory, children were asked to recount the story and were asked specific questions about its content. On most measures, memory was equivalent for radio and television. A reference list accompanies the text. Appendices to the report include the texts of the stories used in the studies, the scoring manual used in the studies of imagination, and the lists of questions used to measure recall. (Author/JL)

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Final Report

Teaching and Learning Program

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RADIO AND TELEVISION EXPERIMENTALLY COMPARED

Effects of the medium on imagination and transmission of content

March, 1982

Patricia Greenfield, Principal Investigator
Department of Psychology
University of California
Los Angeles, California 90024

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The media constitute an extremely important set of nonformal learning environments for American children. Most important among them is of course television. Lesser (1970) estimated that, by the age of 18, the average American child will have spent more of his or her life watching television than in any other single activity but sleep. In the face of this overwhelming presence, radio has been almost forgotten. The impetus for the present project was the desire of the Pacifica Foundation, the umbrella organization for five listener-sponsored radio stations (Los Angeles, Berkeley, Houston, New York, Washington), to develop children's radio programming as an alternative to television.

As their planning and pilot program development got started, Pacifica wanted to stimulate research that would explore the strengths of radio as a learning tool. This seemed like an important and interesting area of research at a time when complaints about television were rife. These complaints were not only about content (e.g., Liebert, Neale, and Davidson, 1973; Liebert, Davidson, and Neale, 1977), but also about the medium itself (e.g., Thomson, 1956; Himmelweit, Oppenheim, and Vance, 1958; Schramm, Lyles and Parker, 1961; Newsweek, 1977; Singer and Singer, 1979). Most pertinent to our research was the complaint that, overall, television encourages passive mental processes (e.g., Carnegie Commission, 1979), and lessens creativity (Stern, 1973) and imaginative play (Singer and Singer, 1976; Calderia, Singer and Singer, 1978). (Although it is clear from the Singers's work (Singer and Singer, 1976; Singer, 1978) that a program whose content focuses specifically on imaginative play can have a positive effect, especially when mediated by an adult, the findings being referred to here concerning the negative impact of TV on imaginative play are general ones, based on average viewing habits.)

On the other hand, there has been speculation extending over a period of 50 years that radio may serve as a stimulus for imagination (Palmer, 1926; Morrisett, 1976; Carnegie Commision, 1979). For example, Morrisett (1976) states: "Since radio depends solely on sound it may be able to provide a stimulus to the imagination that is difficult or impossible for television" (p. 20). Thus, one of radio's special strengths could lie in its ability to stimulate imagination. Yet, before our study, the hypothesis that radio stimulates imaginative processes more than TV had, with one exception, never been empirically tested. This exception, referred to in the Carnegie Commission Report (1979), is a study by Forsythe (1970) documenting the experience of WHA-AM and WHA-TV, which shifted the production of an instructional painting series for children from television to radio. It was found that when instructed by television, children attempted to imitate what they saw on the screen; but when taught by radio, they were

stimulated to use their own imaginations. Further investigation of the impact of radio on imagination was one of the major goals of the proposed research.

Pacifica's interest in developing children's radio gave this goal practical educational importance, as well as theoretical significance. Indeed, there appeared to be more general interest in the radio industry concerning radio's value in stimulating imagination. Ohio State University has given its prestigious communications award to a children's radio drama series in which dramas are stopped before the end and children phone in to contribute their own endings to the story. While the award itself shows appreciation of the use of radio to stimulate active imaginal processes, the show's popularity and ability to elicit these phone-in responses from children indicates that the hope of using radio in this way is a realistic one. Indeed, the existence and success of this award-winning program heightend the ecological relevance of our method for testing imagination, to be described later.

Recently, there has been speculation that the 14-year decline in the average scores on the Scholastic Aptitude Test may stem from high media exposure (e.g., Carnegie Commission, 1979). On the assumption that these tests tap important skills, radio may well reinforce these skills more than TV, because of its greater similarity to the print medium in which the tests are given. Like the printed word, the messages of radio must be verbally self-contained; they cannot rely on the iconic visual context for their transmission, unlike television or naturally occurring conversation (cf. Greenfield, 1972,; Olson, 1977). It may be that constant exposure to a medium, TV, in which verbal or linguistic signs are integrated with visual icons ultimately reduces the attention to the verbal and produces children with less facility in using and manipulating arbitrary symbol systems.

In this analysis, the emphasis is on the visual material of television as iconic, resembling the referents that are portrayed. The contrast is with language as an arbitrary system of signs, lacking any physical resemblance to their referents. (To understand the definitions involved, compare for example a photo of a table [iconic symbol] with the word "table" [arbitrary sign]). This view of a similarity between print and radio contrasts with the emphasis on print as visual; under the latter view, print has more in common with TV than with radio. The implication of our view is that radio, like a printed text, forces thought to rely more exclusively on the representation provided by the arbitrary system of signs that is language. Such reliance is required by the Scholastic Aptitude Test, as well as by other tests and most aspects of school achievement itself. Perhaps this skill could be developed and reinforced by radio, an exclusively

linguistic medium.

Preliminary support for this idea lay in findings by Meringoff (1978) that children's inferences from story content are based more on verbal material when the story is presented by reading a story book than when it is presented by showing a narrated video film. Nevertheless, overall, children relied more on visual sources of information than verbal under both presentation conditions. The use of a radio rather than picture book condition in our research modified this balance much further in the direction of verbal bases for inference. Thus, a second hypothesis of our research was that radio presentation will stimulate more verbally based inferences than television, even though the verbal content of both presentations is identical. In line with Meringoff's findings and general facts about language acquisition (e.g., Greenfield and Smith, 1976), this effect should increase with age.

Certainly we are not trying to make the case for the overall superiority of radio. This would fly in the face of common sense and everyday experience. The Carnegie Commission (1979), furthermore, notes a number of television's special strengths: it can take the viewer to places he or she would never visit in reality; its concreteness aids in establishing definitions; it can teach about processes by clever use of slow motion or fast motion techniques. Rather than prove radio's superiority, we wish to explore the strengths and weaknesses of each medium with respect to the acquisition of knowledge, of cognitive skills, and of metacognitive strategies for acquiring knowledge. Olson and Bruner (1974) conclude that each medium is associated with the unique pattern of skills for dealing with or thinking about the world. Thus, the ultimate educational goal of our research wasto indicate how each medium can best contribute to the child's learning and development.

Cross-Media Comparisons

At the outset of our study, almost no cross-media research had been done involving radio and TV. For children, the one exception was a study by Wetstone and Friedlander comparing live, televised, and audio narration on young children's listening comprehension (1974). However, as Meringoff (1978) points out, "although the mode of presentation was found to have a significant effect on comprehension (the video scores eliciting the highest scores and the audio the lowest), the implications of these media differences are limited by the uncharacteristic nature of the video stimulus, a videotape of the reader sitting in a chair reading a story aloud."

There are, however, a couple of suggestive studies comparing video with picture book presentation. Both Schultz

(1977) and Meringoff (1978, 1980) found that children in a video condition make greater use of visualized action in making inferences. Hence, less use of verbal material in response to video, a result of Meringoff's mentioned above, is compensated by increased use of iconically presented action in forming inferences.

Similarly, Meringoff's free recall results indicate that children in the video condition recall action better, children in the picture book condition recall figurative language better. Again, these differences ought to be augmented in the proposed research by the removal of all visual iconic material in a purely audio presentation.

The finding about figurative language is interesting because it may relate to current observations about children's declining abilities to write. In writing, words are used to create impressions in other sense modalities, especially vision, and figurative language is certainly useful in doing so (although mainly in creative rather than scientific writing). Perhaps, then, radio exposure to stories could help children develop familiarity with use of figurativee language, thus enhancing certain skills in both oral and written expression.

Meringoff (1978 , 1980) also found that children in the picture book condition used their own experience as a basis for inference more than children in the television condition. This finding ties in with imagination considered broadly as all representational processes having no immediate external model. Essentially children used such imaginal processes to bring their own experience to bear on the problem at hand. This integration of the child's experience also indicates more personal involvement with the material.

But there is a negative side of this coin as well. In considering the potential effects of narration and film on the transmission of story information, the critical differences lie in both the amount of information and the form this information takes. The film situation is comprised of the narration of the story text plus the addition of film images, yielding more total information. The form of this extra information may itself provide additional aids to memory for the content. Imagery in general can be a powerful mnemonic tool. Although the source of the effect is the subject of recent controversy, it is evident that the imageability of verbal material has an effect on memory (Paivio and Csapo, 1973; Kosslyn and Pomerant, 1977). Differential effects of these media on children's memory for story content might be attributed to the presence or absence of film images. This positive effect of televised images should be particularly strong for content that is intrinsically visual in nature.

The ability to generate inferences about a story might depend in part on the knowledge resources of the child. This ability to make inferences about a story has been shown to improve with age (Paris and Upton, 1976), and might be partly due to the increased experience with the world. An example might be in inferring a character's goal or internal response to an event, which would depend in part on the child's general awareness of goals, plans and affective responses to events, possibly gathered through his or her own experience. Similarly, it could be expected that if a child is generally capable of drawing an inference, the presence or absence of the essential information is crucial to whether the inference actually is made. In considering the film or radio media, the film is clearly providing more information which might be utilized in generating explanations for story events, and inferences, than is the narration alone.

Thus, film gives more while requiring less of the child. Hence, from an educational point of view, the images are both a strength and a weakness. One implication of this analysis is a developmental one: that radio would be more effective with older children and would stimulate the use of their developing knowledge base.

There are also cultural differences in knowledge bases. Differences in world experience and knowledge may affect radio transmission of content more than television by requiring the child to bring more background information to its interpretation. Conversely, television may be comprehensible across a wide variety of experiential and cultural backgrounds. In this way, TV could be a more democratic medium. Because of this issue it was crucial to compare children from different SES and ethnic groups in their responses to the two media; and this comparison was integral to our research.

METHOD

Use of Stories

Stories were selected as the media content to be examined, because they comprise a familiar and effective means of transmitting information to children. Their entertainment value is compatible with the media formats to be investigated; most children are familiar with radio and television as entertainment sources. In addition to their information content and entertainment value, stories have been the focus of recent research in the area of children's memory. These investigations indicate that children are increasingly sensitive to the structure of stories, as a function of age, and that their memory for the stories improves (Mandler and

Johnson, 1977; Stein and Glenn, 1977). The fictional aspect of stories also made them suitable for the investigation of imaginal processes.

Story Materials

Our studies used the same two stories, "A Story, A Story," an African folk tale about the origin of stories (presented in Appendix 1), and "Strega Nona," (presented in Appendix 2), a sorcerer's-apprentice style talk of a young man's misadventures with a witch's magic pasta pot. "A Story, A Story" was also used by Meringoff (1978, 1980). Hence, comparison of our radio with Meringoff's picture book condition is possible.

A variety of animated films available in both video and audio cassette format were previewed before the final selection. The materials were supplied by Weston Woods' Studios. Each story was adapted from a children's story book and made into: (1) an animated film in 3/4" video cassette format, for playback on a TV monitor, and (2) an audio cassette for playback on a tape recorder. In both video and audio versions the story book's verbal text is largely preserved. For experimental purposes it seemed better for the narrations of the video and audio form to be identical rather than highly similar, so new sound tracks were made and used for both versions of a given story. New sound tracks also enabled us to have the same narrator for both stories, eliminating voice or accent as a factor, should the two stories elicit different responses (Weston Woods' sound tracks and cassettes had an Italian accent for "Strega Nona," a West African accent for "A Story, A Story).

The criteria for the choice of the specific stories were:

1. Authenticity: The studies used authentic, pre-existing stories found in published books and Weston Woods' productions, mainly distributed to schools.

2. Unfamiliarity: "Strega Nona" was only recently published (De Paola, 1975) and "A Story, A Story" (Haley, 1970) still seemed to be a relatively unknown African story. Conversation with 29 children in pilot studies revealed that none of them was familiar with either story.

3. Quality: These seemed to be enjoyable stories which would hold children's attention. Pilot study subjects responded well to them.

4. Time: Both televised films and audio tapes have an

approximate length of 9-1/2 to 10 minutes.

Subjects and Design

The first year's research involved middle-class white children from Los Angeles area schools. Children for whom English was not a first language and those identified as learning disabled were eliminated. Our young subjects were in first and second grade, our older subjects in third and fourth. These two groups also fell within the age range of the 9 PM Turn On, a radio show being developed by KPFK, the Los Angeles Pacific station. Because this show included a story reading component, these studies provide useful information about the advantages and disadvantages of radio as a medium for presenting stories to children in the age range of the intended audience. A total of 48 children from each social class and ethnic group participated in each study. In each study, there were 24 children in each age group, all of whom were exposed to both stories. Half of the children in each group, a total of 12, were exposed to a televised animation version of "Strega Nona" and an audio version of "A Story, A Story." The other half received the televised animation version of "A Story, A Story," and the audio version of "Strega Nona." Within each condition, half (6) received the video version first, half the audio. In this way, each age group was divided into four conditions. Within an age group, virtually equal numbers of boys and girls were randomly selected and randomly assigned to one of the four conditions. Presentation of the two stories was at different sessions. Most sessions were one week apart.

Contagion effects were minimized in two ways: (1) children in each group were selected from different classrooms in each school; (2) children were asked not to discuss the experiment with their classmates until it was concluded, which was generally successful.

The advantages of this design were several-fold. By having each child respond to both audio and video presentations, we controlled for individual differences. Yet the fact that each child responds to two DIFFERENT stories removed the effect of repetition which would be present if the same story were presented twice to one child (once in each format). The use of two stories rather than one improves the potential generalizability of the results, should the same pattern of results be found across these two very different stories.

Data Analyses

Each dependent variable was analyzed with two multiple regression analyses (Pedhazur, 1977). One used only

between-subject variables and their interactions; the other used within-subject variables, including interactions with between-subject variables. The between-subject variables used in the analyses were age, class, ethnicity, and order of medium. The within-subject variables were medium, story, and interview (first or second). This report will concentrate on the main effects and moderating interactions related to medium, class, ethnicity, and age. These variables were central to testing our hypotheses.

STUDY OF IMAGINATION

Procedure

The children were individually tested by the experimenter in an unused classroom in the school. The child was seated at a table next to a female experimenter, always of the same ethnic group as the child. Each session began with a brief informal conversation to help the child feel at ease. The story was introduced as follows: "We are going to look/listen to a story. It is called "Strega Nona"/A Story, A Story." After we have heard/seen the story, we are going to talk some about it." Then the story was presented once to each child. Finally, the child was asked to complete the story.

In the video presentation, the video tape of a film was presented to the child on a television monitor. The television monitor was located in front of the subject at the child's eye level. In the audio story presentation, an audio tape was played on a combination radio/cassette recorder which stood in front of the child. In this way, audio presentation of the story simulated radio, just as video presentation simulated TV. Audio delivery of the stories approximated the 10-minute length of the films.

Both video and audio presentations were stopped just prior to the end of the story. Piloting revealed that some children found the completion of a completed story incomprehensible. Therefore, "A Story, A Story," was stopped after Ananse succeeds in obtaining the Sky God's stories (see Appendix 1), and "Strega Nona" was stopped just after the witch, Strega Nona,stops the pasta pot run amok (see Appendix 2).

Immediately after the video and audio presentation, the child was asked by the experimenter in an open-ended question to continue the story: "Now, I would like you to tell me a story about what you think will happen next." In case the child did not respond, the experimenter resorted to the use of systematic prompts, which were variations on a theme: "What

do you think is going to happen now? Can you tell me about it?" etc.

Each child's story was tape recorded and later transcribed. The experimental condition of each story was coded by number on the back of each transcription.

A scoring system was constructed and a scoring manual prepared (See Appendix 3). Two independent raters learned the scoring method and 87% agreement was attained. Further practice was then provided by scoring all the interviews in the white, middle-class sample twice and resolving inconsistencies.

(It was originally planned to have children also produce picture completions as an iconic visual measure of imagination. However, drawings would be biased by the fact that some children see the film, while others don't. The verbal measure is not biased in this way, as all chilren hear the same audio content. Also, pilot testing of drawing completions produced very steroetypic responses. Hence, this idea of measuring imagination through drawing was abandoned.)

Coding

The response measures designed for this study fall into two categories:

1. Original Story Content

2. Total Story Output

Original content is a measure of imagination since it indicates the child's ability to internally generate story ideas: original material is created by the child, rather than by the preceding media presentation.

Total story output reflects the ability of the child to fill up a blank story canvas. Presumably, the more story material the child can generate, the more his or her imagination has been stimulated.

Our basic coding unit was the simple proposition, termed an event. It could be either original (not found in the stimulus story) or not. An original event could contain original characters, settings, feeling, or dialogue. The production of original elements consituted the basic definition of imagination used in the study. In addition to th qualitative variables summarized above, there were some quantitative variables: total number of words and number of repetitive words. The first was a measure of total output, the second of unoriginal output which did not springboard into

original material. A detailed description of the coding system is presented in Appendix 3.

Our second year's data collection added groups of black middle-class, white working-class, and black working-class children.

Results

The following dependent variables were subjected to the regression analysis already described:

Imaginative Events
Specific Characters
Direct Dialogue
Indirect Dialogue
Emotional Feelings
Time Settings
Location Settings
Imaginative Quality
Total Number of Words
Number of Words Repeating Story

(See Appendix 3 for operational definitions of these variables)

EFFECTS OF THE MEDIUM. As hypothesized, radio stimulated the imagination significantly more than did television. This was manifest in the regression analysis in a number of main effects. We will start with our over-all measure of imagination, number of imaginative events. The mean number of imaginative events stimulated by radio presentation was 11.30, in contrast to 9.49 for television ($F=6.19$, $p < .025$, one-tailed test). Radio presentations not only elicited more imaginary events, they also stimulated the production of more imaginary characters of a specific nature ($F=4.0$, $p < .05$ one-tailed tests). Television in contrast, stimulated the production of more words repeating the stimulus story than did radio. The means for the two media are 20.6 repetitive words following television presentations, 8.17 repetitive words following radio presentations ($F=10.73$, $p < .02$, two-tailed test). Thus, radio tends to stimulate the creation of new story material, TV to stimulate the repetition of old story material.

The initial impact of each medium presented in the first interview seemed to carry over to the other medium used in the second interview. In the regression analysis, this was manifest in a significant interaction between medium (TV versus radio) and interview (first versus second) as they affected number of imaginative events. Hearing the first story in a radio version stimulated a more imaginative response to the television version of the other story presented in the second interview. In contrast, seeing a televised presentation first reduced imaginative response to the radio presentation of the other story heard second. (See Figure 1). A parallel significant interaction occurred for imaginative quality, but this will not be presented in detail. This finding indicates that the set created by a given medium can be even more powerful than the immediate effects of the medium itself.

The effect of the medium was not, however, the same in every group. There was a significant ethnicity-by-medium interaction for a number of the story completion variables. All went in the direction of indicating that medium made little or no difference in the imaginative response of black children. Group means for the significant ethnicity-medium interactions are presented in Table 1.

GROUP DIFFERENCES: First, we should mention that there are no main effects of age: imaginative response does not show developmental change within the age range studied.

Class and ethnicity, in contrast, both had an impact on imaginative response. Working-class children showed more imaginative response than middle-class children, white children more than black. These main effects of class and ethnicity were manifest in five separate measures of imagination: imaginative quality; number of imaginative events; number of specific, original characters; and number of original time settings. Working-class and white children produced longer, as well as more imaginative stories in comparison with middle-class and black children. These main effects of class and ethnicity are presented in Table 2, with F values and significance levels. In addition, there was one other main effect of ethnicity going in the same direction. White children produced more original, direct dialogue than black children. Similarly, there was one variable affected by class but not ethnicity. This variable, number of original feeling states, also fit into the pattern: working-class children produced more original feeling states in their story completions than did middle-class children. The F values and significance levels for these variables are also presented in Table 1.

There was also an interaction between class and ethnicity. The most important characteristic of interaction was that working-class white children were by far the most imaginative of all the groups. This interaction showed up for the following story completion variables: imaginative quality, number of specific, original characters, and number of time settings. These interactions are presented in Table 3.

STUDY OF MEMORY

This study used the same two stimulus stories, the same two media, and children from the same schools and classrooms as the imagination study. Several aspects of memory were investigated; recall, free and aided; visual reconstruction; and inference.

Procedure

Children were individually tested at their schools. For the first session, each child was given sufficient time to feel comfortable in the experimental surroundings.. The two female experimenters introduced themselves and briefly explained the experimental equipment. Then the adult who remained in the room during the presentation of the story gave the following instructions to the child for both sessions.

"I would like to share a story with you today. It is called (name of story). I would like you to listen carefully because (name of other adult) is going to ask you about the story later. Do you have any questions before the story starts? Are you ready to hear the story?"

At this point, the second adult left the room, and then the story was presented. At the conclusion of the story, the adult asked, "Did you like the story?" and "Did you ever hear ore see that story before?" After the second adult returned to the room, the adult who was present for the story gave the following instructions to the child.

"Now, I would like you to tell (name of second adult) as much of the story as you can because she has not heard it before. This was a long story and no one could remember everything from the story. But, I would ,like you to tell (name second adult) all you can remember about the story."

The child's retelling was recorded. Before ending the recall phase, the child was prompted with, "Do you remember anything else from the story?" The adult who was present for

the story concluded the recall phase by stating that, "You did a nice job telling (name of second adult) all you could remember about the story."

The adult who was not present for the story introduced the next task by saying,

"Now, I am going to ask you some questions about the story. You probably won't be able to answer them all because they are very hard questions and there are no right or wrong answers to them. I would like you to do the best you can and try to answer."

Then this adult continued by asking the appropriate questions, while the child's answers were recorded. These questions fell into three categories: aided recall, detail, and inference. The three sets of questions are presented in Appendices 4, 5, and 6. Appendix 7 presents the questions for each story in the actual order they were presented to the subjects. The adult concluded the question phase by assuring the child that, "You did a good job trying to answer all the questions."

The adult who was present for the story then introduced the last task with,"Now, I am going to show you some pictures from the story." A sample picture containing major story characters was displayed along with "Can you tell (name of second adult) who is in this picture?" The adult who was present for the story pointed to each figure in turn and provided a name for the figure if necessary. Then, the adult told the child, "I have some pictures from the story, but they are all mixed up. I would like you to put them in order so that they tell (name of second adult) the story from the beginning (indicating position on table) to end (indicating position further along table.)" After the child had arranged the pictures, an option to reorder the pictures was provided by asking "Would you like to look them all over to see if you have them in the order you want?"

At the end of the picture task, the child was escorted back to the classroom. No indication was given that the child would return for a second session, and the child was asked to keep each session a secret so that the other children would also be surprised when they came.

Coding

Written transcripts of the audiotapes for each session were scored blind as to age and medium condition.

EXPRESSIVE LANGUAGE. Each child's retelling of the story was scored for the inclusion of expressive language. Expressive or figurative language involved sound patterns, repetition of words, alliteration, rhymes and rhythmic passages. Scorable units of expressive language were tallied as absent or present in recall. To be counted as expressive, the child had to use the actual expressive language, a synonym or a reasonable approximation in an expressive manner. References to content that was expressive in the story was coded as "incomplete" expressive language. Thus, "tiger of the terrible teeth" would be scored as expressive, whereas "the leopard" is not intrinsically expressive and would be scored as incomplete. Interrater reliability was 89%. Finally, selection of the correct alternative in the forced-choice questions was tallied as one.

RECALL MEASURES. Recall of the story was also scored for the total number of words, number of specific and vague characters, amount of direct and indirect dialogue, number of time settings and number of location settings. Literal expressions, synonyms and phrases capturing the gist of the story content were all scored. Vague and specific characters correspond to undifferentiated and differentiated characters respectively. The contrast between BIG ANTHONY (specific) and THE BOY or EVERYONE (vague) illustrates this distinction. Direct and indirect dialogue correspond to marked and unmarked exchanges between characters. The contrast between THE WITCH SAID "DON'T TOUCH THE POT" (direct), and THE WITCH TOLD HIM NOT TO TOUCH THE POT (indirect) illustrates this distinction. Repeated usage of a character, discrete time or location was still counted as one, thus the number of different times and locations were tallied. Interrater reliability was 87%.

INFERENCE MEASURES. The responses to inference questions were recorded and modal responses were tabulated. The corresponding justification or explanation for each inference response was scored for its source of information with the following categories.

The "visual" content category applied to information only in the visual channel. It includes any action or character description, particularly facial expressions, visible on the screen and not conveyed verbally. The "verbal" content category applied to information only in the soundtrack. It includes non-illustrated narration of events and excludes dialogue. The "audiovisual" content category

applied to information dually presented in the visual channel and soundtrack in the video version of the story. Because scoring was blind to medium condition, responses to radio presentations could be scored as verbal and audiovisual although no visual information was available. This distinction was retained because content selected for animation may be qualitatively different from non-visual story content in terms of thematic importance and translatibility to visual images. Furthermore, using content categories removes the ambiguity of scoring responses for children in the televised version. When information is presented dually in verbal and visual channels, it is impossible to assess whether the child ascertained the information from both channels jointly or either one alone. Distinguishing two types of content allows both a purely verbal comparison and an audio-visual comparison between media. The few visual responses that were scored for the audio condition were ignored in analyses.

The justifications were also scored for the inclusion of "action" and "dialogue" from the story. Action and dialogue were not mutually exclusive categories from the visual, verbal and audiovisual categorization. These five categories all assess information actually contained in the story presentation.

In contrast, the "inferred" about the story category applied to information that was directly related, while going beyond the explicit story content. It includes inferences and elaborations of the story. The "outside" of story category applied to information unrelated to the story. It includes the child's personal opinion, the child's course of action, and general world knowledge.

Each justification response was tallied in every appropriate category. Interrater reliability was 80&, which is exceptionally satisfactory given the difficulty of working with his type of material.

PICTURE SORTING. Each child's sequential ordering of the seven pictures was compared to the correct order to yield a quantitative deviation score. The deviation score was determined by a graphic method (Hays, 1963, p. 648) and reflects the number of inverted pairs and the magnitude of the discrepancy.

Results

EFFECTS OF THE MEDIUM. In most respects, memory was equivalent across media. Thus, for example, there were no medium differences in number of words repeating the stimulus story. The particular differences that did appear, however,

relate to each medium's particular qualities. Thus, radio presentations elicited more recalled direct dialogue, as predicted ($F=4.46$, $p < .05$). Television presentations, in contrast, stimulated better reconstruction of a story sequence in pictures. Finally, television presentation elicited better recall of visual details presented VERBALLY in the narration of both the radio and TV versions, but augmented by a VISUAL image in the television version ($F=51.14$, $p < .001$, one-tailed). An example of this type of question was:

Did Ananse cover the doll with latex gum from

(1) top to bottom
or
(2) bottom to top?

In terms of inferential memory, the content of inferences was the same across media, but the sources of them were different. Radio elicited more inferences based on audio information ($F=5.51$, $p < .05$, one-tailed), as well as more inferences based on sources outside the story (such as the child's own experience). This is closely related to imaginative response, and confirms the potency of radio vis-a-vis imagination. Television, in contrast, stimulated more use of action information as a basis for inference ($F=21.86$, $p < 001$, one-tailed). Finally, information presented both verbally and visually in the televised stories, stories verbally only on the radio, more frequently served as a basis of inference after the television presentation ($F=6.83$, $P<.01$, one-tailed), another indication of the reinforcing quality of the visual image.

GROUP DIFFERENCES. Over all, the pattern of group differences consisted of the presence of age differences in the absence of class and ethnicity differences. This pattern of results held for the overall memory measure, total number of words ($F=35.11$, $P < .001$, one-tailed), as well as for a number of more specific recall measures: number of specific characters ($F=86.31$, $p < .001$, one-tailed), amount of direct dialogue, ($F=17.76$, $p < .001$, one-tailed) location settings ($F=23.27$; $P < .001$, one-tailed). In all the above cases, older means more. There is one variable, in addition, that shows the effect of ethnicity and class, as well as age. This is number of added statements, the elaboration of the story beyond the original stimulus. Older children do this more than younger ($F=19.94$, $P < .001$), black children more than white ($F=32.72$, $P<.001$). In addition, there is an interaction of ethnicity and class, such that working class black children add more than any other class-ethnic category to their recalled stories.

In terms of inferences, the general pattern is to have

age, class, and ethnicity effects. Thus, older, white, and middle-class children use audio information as a basis for inference more than younger, black, and working class children (age: F= 11.65, P <.002; ethnicity: F= 42.94, P <.002; class+ F= 32.35, P<.002, all two-tailed).

These same groups more often rely on audiovisual sources for referencing (age: 10.9, P<.002; class: F= 6.99, P<.02, ethnicity: F=13.44, P<.002, all two-tailed).

DISCUSSION

Imagination Study

Our results strongly supported the basic hypothesis that radio stimulates imagination, while television depresses it. Evidence that radio stimulates imagination more than television is manifest in the large number of story completion variables for which radio induced more original material than television. It is further supported by the complementary finding that story completion following a televised story include more repetition of the stimulus story than those following a radio story. Evidence for the depressing effect of television vis-a-vis imagination is found in the fact that radio elicits less imaginative response following a television presentation of another story than it does before one. It is hard to know whether this influence of one medium of response to the other stems from qualities intrinsic to each medium or is mediated by a socially induced set that, in the U.S., television is associated with less mental effort than other media (Salomon, in press).

Thus, our findings support the claims of the Singers that television is a negative influence on children's imagination (Singer and Singer, 1977; Singer, 1978; Singer and Singer, in press). More specifically, our finding fits into Meline's (1976) results where he found that, for sixth and seventh graders, video presentation of a problem led to fewer original solutions than audio (or print) presentations. Watkins and Coulombe (1981) compared TV, radio, and print stories in a written story completion task given to sixth graders. They found, parallel to our results, that radio elicited more creative written narratives than television. However, print elicited the most creative of all!

On the other hand, Murray, Kwiatek, and Clarke (no date), using a story-telling measure of imagination, did not find the anticipated difference between heavy and light viewers in the fantasy element. However, because of the nature of their measures, it may have been difficult to

separate out true fantasy from accounts of fantastic phenomena actually seen on TV. That is, story repetition--encouraged by TV according to our results--may have gotten mixed in with original story material. If so, these opposing trends would have neutralized each other, thus masking any negative effect of heavy viewing on imagination.

There were differences in imaginativeness across class and ethnic lines: working class children were more imaginative than middle class children; white children were more imaginative than black. Nevertheless, the positive influence of radio held in all the groups except the black, where radio was not successful in elevating the level of imaginative response. To our knowledge, ours is the first study that has looked at the impact of radio and television on imagination in various subcultural groups.

Memory Study

In terms of our initial hypotheses, the results were more mixed in this study. In the area of recall, overall recall was equivalent across medias. This finding goes against the general idea that visual imagery has a general effect in enhancing memory (Kosslyn and Pomerantz, 1977; Poivio, 1971). The effects of medium on recall were more specific: radio favored recall of dialogue while television favored recall of details that could be presented visually as well as auditorily. The former finding accentuates a non-significant advantage of the picture book over the television presentation in Meringoff's (1978, 1980) original stdy. We had predicted that radio would have stronger effects than Meringoff's book condition because the latter had accompanying still pictures, as well as the oral narrative found in our radio version. However, Char and Meringoff (1981), adding a radio condition to Meringoff's basic design, dd not find that more dialogue was recalled as a function of medium. The most likely explanation for this discrepancy is a developmental one: Char and Meringoff had a second grade sample, in the age range of our younger group. We found that this group produced relatively little dialogue overall. Therefore, it is quite possible that a developmental inability to produce dialogue in recalling a story may have prevented the medium's impact on dialogue from showing up in Char and Meringoff's young sample.

Whereas Meringoff had found that expressive language figured more prominently in memory after a storybook presentation than after a television presentation, this did not hold up in Char and Meringoff's later study. Indeed, they found no medium differences for expressive language. We found that effect for middle-class, but not working class children: the former group recognized more expressive language in the

radio condition than television condition. Char and Meringoff, however, used an exclusively working class sample.

Another conflict between the results of our two studies is that Char and Mernigoff found that television produced better overall recall than radio, whereas we found no differences. This could be due to the fact that our measures were not the same. We should explore this question further by adapting their overall measures to our study.

We also found an effect of medium on our visual measure of memory, the picture sequencing task. This effect (in favor of television) paralleled Meringoff's finding when she compared picture book and TV presentations.

As for the more interpretive aspect of memory as measured by the inference questions, radio, like Meringoff's picture book condition, elicited more use of verbal and out-of-story sources of inference. We link the use of out-of-story material to radio's power in stimulating imagination, for use of an out-of-story source involves going beyond the information presented in the stimulus story itself. Television's strength vis-a-vis inference also replicated Merinoff's findings in her TV-picture book comparison: after a TV story, children more frequently based their inferences on action information following than after a radio story.

As for group differences in recall, the overall pattern was change with age (as previous studies have found--Cohen and Salomon, 1979; Collins, 1979; Meringoff, 1980; Smith, 1981; and Watkins, Calvert, Huston, Steen and Wright, 1980) with similarity across class and ethnic lines. Class and ethnicity effects were, however, the rule in the inference results. Thus, cultural differences came into prominence for the least stimulus-bound memory task: the explanation of inferential thinking. It is interesting that on the memory tasks in which there are definite right and wrong answers, there is equivalent performance across class and ethnic lines. Thus, in the transmission of factual information our study indicates that the mass media of radio and television are basically democratic, mass media in a profound as well as superficial sense. Television, however, seems somewhat more democratic than radio: radio did not elicit an imaginative response in black children; nor did it elicit greater recognition of figurative language in working class children. Thus, while television may require less active participation than radio, it is our most valuable tool for transmitting information to people from a wide variety of backgrounds.

DISSEMINATION OF RESULTS

Greenfield, P., Geber, B., Beagles-Roos, J., Farrar, D., and Gat, I. Television and radio experimentally compared: Effects of the medium on imagination and transmission of content. Paper presented to the Society for Research in Child Develoment, Boston, April, 1981. (This paper was part of a symposium on the cognitive impact of the medium organized by the principal investigator. It has now been submitted to the Journal of Communication.

Greenfield, P. Cognitive impact of the media: Implications for a pluralistic society. Invited address, Western Psychological Association, Los Angeles, April 1981.

Gat, J.B., Beagles-Roos, J., Geber, B., and Greenfield, P.M. Media effects on children's inferential comprehension. Paper presented to the Western Psychological Association, Los Angeles, April, 1981.

Beagles-Roos, J. and Gat, I. The specific impact of radio and television on children's story comprehension. To be presented at the International Communication Association, Boston, May, 1982. Also submitted to the Journal of Educational Research.

The principal investigator has been invited to participate in the Children's Television Conference, March 23-26, 1982, at Boystown, Nebraska, and to chair a session on cultural differences in response to television. The conference is being organized by Gavriel Salomon, Hebrew University, Jerusalem and John Murray, Boystown. J. Beagles-Roos is attending the conference as a guest.

The principal investigator has also been invited to write a book about children and television for the Developing Child series of Harvard University Press. A grant proposal, based on this project, is in the works with the collaboration of Sharon Maeda, the Executive Director of Pacifica Foundation. This proposal will be for a project of research on the effects and effectiveness of documentary programming for adolescents and children.

There will be continuing dissemination in the future. A monograph, to be submitted to SRCD MONOGRAPHS, based on this report and giving an overview of the total project, is tentatively planned.

Final Report

Teaching and Learning Program
National Institute of Education
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RADIO AND TELEVISION EXPERIMENTALLY COMPARED

Effects of the medium on imagination and transmission of content

Patricia Greenfield, Principal Investigator
Department of Psychology
University of California, Los Angeles

SUMMARY

The purpose of this study was to compare two media--radio and television--with respect to their ability to stimulate children's imagination and to transmit information.

The research involved a series of studies in which children were presented with different stories in both a radio and television format. Depending on the study, children were asked to respond with imaginative responses, inferences, or story recall. Each study involved 48 children equally divided among boys and girls, and divided into two age groups: 6-1/2 to 8, and 9 to 10-1/2. Studied included children from middle- and working-class white families, middle- and working-class black families. The studies were carried out in elementary schools in the Los Angeles area.

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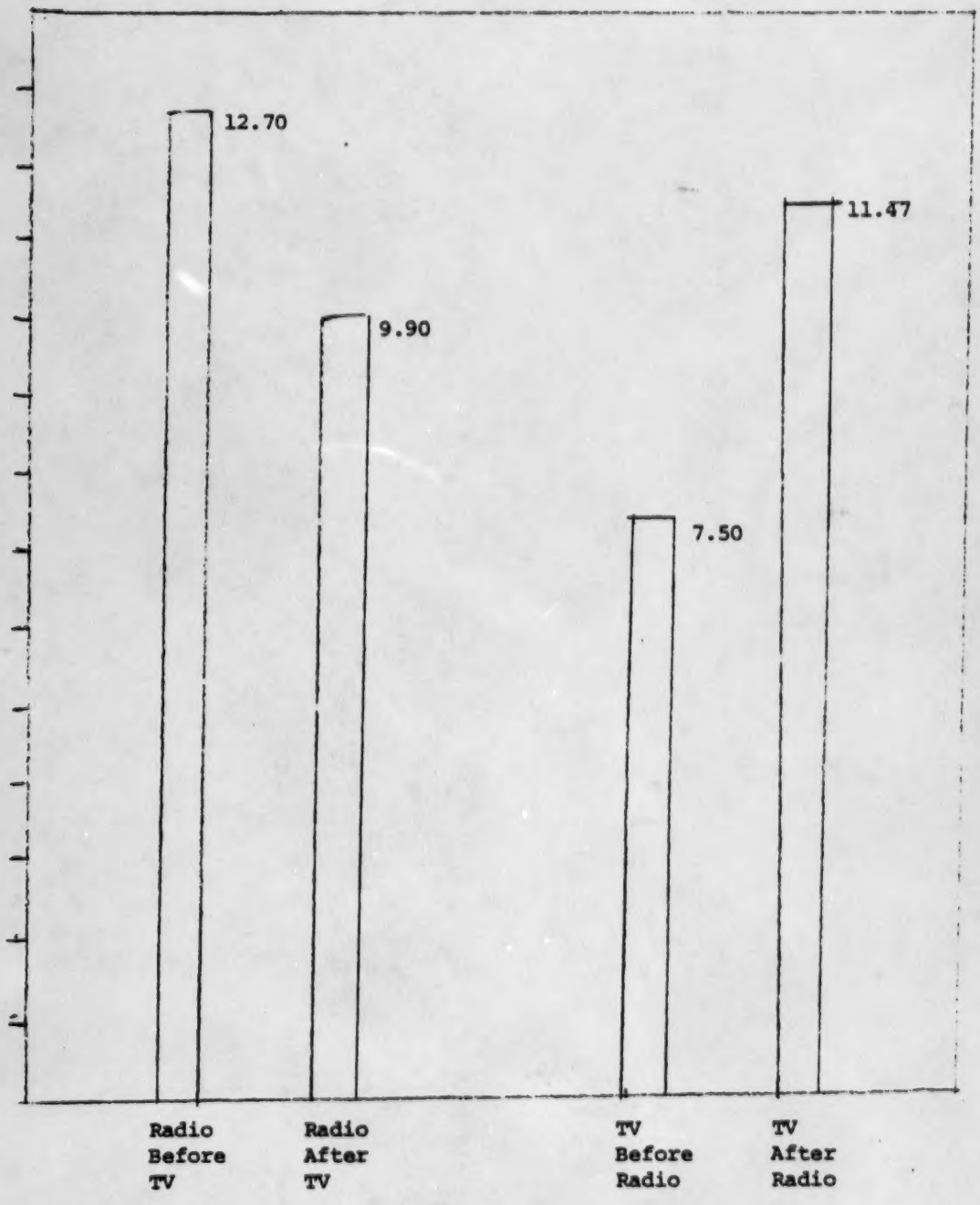

Figure 1. NUMBER OF IMAGINARY EVENTS PRODUCED UNDER DIFFERENT CONDITIONS OF MEDIUM AND ORDER

TABLE 1

Means for Story Completion Variables Showing Two-Way Interactions Between Medium and Ethnicity

Variable	Black		White		F	P*
	Radio	TV	Radio	TV		
Imaginative Quality	2.0	2.4	7.3	5.9	7.88	.02
No. of Imaginative Events	6.0	5.9	16.6	13.0	5.61	.05
No. of Specific, Original Characters	0.4	0.4	1.3	0.8	9.81	.02
No. of Original Time Settings	0.3	0.5	1.7	1.3	8.51	.02
Total No. of Words	66.7	77.8	165.3	140.9	6.69	.02

* P values in this table are for two-tailed tests.

TABLE 2

Means for Story Completion Variables Showing Main Effects of Class or Ethnicity

Variable	Class				Ethnicity			
	Middle	Working	F	P*	Black	White	F	P*
Imaginative Quality	2.8	5.9	7.10	.02	2.2	6.6	14.38	.002
No. of Imaginative Events	6.6	14.2	7.63	.02	6.0	14.8	10.56	.02
No. of Specific, Original Characters	0.3	1.1	12.96	.002	0.4	1.1	8.40	.02
No. of Original Feelings	0.4	0.8	13.97	.002	---	---	----	n.s.
No. of Original Time Settings	0.6	1.3	7.14	.02	0.4	1.5	18.62	.002
Amount of Original Direct Dialogue	---	---	---	n.s.	0.3	1.1	5.33	.05
Total No. of Words	74.9	150.5	7.05	.02	72.3	153.1	8.05	.02

* P values in this table are for two-tailed tests.

TABLE 3

Means for Story Completion Variables Showing Two-Way Interactions Between Class and Ethnicity

Variable	Black		White		F	P*
	Middle Class	Working Class	Middle Class	Working Class		
Imaginative Quality	2.0	2.4	3.7	9.4	5.14	.05
No. of Specific Original Characters	0.4	0.5	0.3	1.8	9.81	.02
No. of Original Time Settings	0.4	0.3	0.8	2.2	8.51	.02

* P values are two-tailed

APPENDIX 1

STREGA NONA

In a town in Calabria, a long time ago, there lived an old lady everyone called Strega Nona, which meant "Grandma Witch."

Although all the people in town talked about her in whispers, they all went to see her if they had troubles, because Strega Nona did have a magic touch.

She could cure a headache, with oil and water and a hairpin. She was very good at getting rid of warts. She made special potions -strange and mysterious drinks- for the girls who wanted to find husbands and for the boys who wanted to find wives. Oh, yes, Strega Nona did have a magic touch.

But Strega Nona was getting old, and she needed someone to help her keep her little house and garden, so she put up a sign in the town square. And Big Anthony, who did not pay attention, went to see her. "Anthony", said Strega Nona, "you must sweep the house and wash the dishes. You must weed the garden and pick the vegetables. You must feed the goat and milk her. And you must fetch the water. For this, I will give you three coins and a place to sleep and food to eat."

"Oh, grazia," said Big Anthony.

"The one thing you must never do," said Strega Nona, "is touch the pasta pot. It is very valuable and I don't let anyone touch it!"

"Oh, si, yes," said Big Anthony.

And so days went by. Big Anthony did his work and Strega Nona met with the people who came to see her for headaches and husbands, warts and wives.

Big Anthony had a nice bed to sleep in next to the goat shed, and he had food to eat.

One evening when Big Anthony was milking the goat, he heard Strega Nona singing: "Too-tee-too-the-loo-tee-too-tee-tee." Peeking in the window, he saw Strega Nona standing over the pasta pot.

Bubble, bubble, pasta pot
Boil me up some pasta, nice and hot
I'm hungry and it's time to sup.
Boil enough pasta to fill me up

And the pasta pot bubbled and was suddenly filled with steaming hot pasta.

"How wonderful! said Big Anthony. "That's a magic pot for sure!" Then Strega Nona Sang:

Enough, enough, my pot of clay
Until I'm hngry for another day

But, Big Anthony did not see Strega Nona blow three kisses to the magic pasta pot. Too bad.

The next day when Big Anthony went to the town square to fetch the water, he told everyone about the pasta pot.

And naturally everyone laughed at him, because it sounded so silly -a pot that cooked all by itself.

"I'll show them! said Big Anthony to himself. "Someday I will get the pasta pot and make it cook! And they'll be sorry.

Two days later Strega Nona said to Big Anthony, "Anthony, I must go over the mountain to the next town to see my friend, Strega Amelia. Sweep the house and weed the garden. Feed the goat and milk her and for your lunch there are some bread and cheese in the cupboard. And remember, don't touch the pasta pot."

"Oh, ye-yes Strega Nona," said Big Anthony. But inside he was thinking, my chance has come!

As soon as Strega Nona was out of sight, Big Anthony went inside and sang:

Bubble, bubble, pasta pot,
Boil me some pasta, nice and hot.
I'm hungry and it's time to sup.
Boil enough pasta to fill me up.

The pot bubbled and boiled and began to fill with pasta.

"Aha!" said Big Anthony, and he ran to the town square. He jumped on the fountain and shouted, "everyone get plates and forks and platters and bowls. Pasta for all at Strega Nona's house."

Of course everyone laughed, but ran home to get forks and plates and platters and bowls, and sure enough, when they got to Strega Nona's the pasta pot was so full it was beginning to overflow.

Big Anthony was a hero!

He scooped out pasta and filled the plates and platters and bowls. There was more than enough for all the townspeople. The pot was never empty.

When all had had their fill, Big Anthony sang:

Enough, enough, my pot of clay
Until I'm hungry for another day.

But he did not blow the three kisses!

Pasta was pouring out of the pot all over the floor of Strega Nona's house and was coming out of the door!

Big Anthony rushed in, took the pot off the floor, grabbed the cover and put it on the pot and sat on it. But the pasta raised the cover and Big Anthony as well and spilled on the floor of Strega Nona's house.

"Stop!" yelled Big Anthony.

But the pasta did not stop. It was on its way down the road and all the people were running to keep ahead of it.

"We must protect our town from the pasta," shouted the mayor. "Get mattresses, tables, doors, anything to make a barricade." But, the pot kept bubbling and the pasta kept coming!

"We are lost," cried the people, "the pasta will cover our town."

And it certainly would have, had not Strega Nona come down the road home from her visit. She didn't have to look twice to know what happened.

She sang the magic song and blew the three kisses and with a sputter the pasta pot stopped boiling.

"Oh, grazia-thank you" the people cried.

(Story ends here for Imagination Study.)

But then they turned on poor Big Anthony. "String him up," the men of the town shouted. Now, wait," said Strega Nona. "The punishment must fit the crime." And she took a fork from a lady standing nearby and held it out to Big Anthony. "All right, Anthony, you wanted pasta from my magic pasta pot," Strega Nona said, "and I want to sleep in my little bed tonight. So start eating."

And he did - poor Big Anthony.

APPENDIX 2

A STORY A STORY

Many African stories, whether or not they are about Kwaku Ananse the "spider man", are called "Spider Stories." This is about how that came to be.

You will find may African words in this story. If you listen carefully you can tell what they mean by their sounds. At times words and phrases are repeated several times. Africans repeat words to make them stronger. For example: "So small, so small, so small," means very, very, very small.

This story begins as do many African stories:
"We do not really mean, we do not really mean that what we are about to say is true. A Story, A Story; let it come, let it go."

Once, oh small children round my knee, there were no stories on earth to hear. All the stories belonged to Nyame, the Sky God. He kept them in a golden box next to his royal stool.

Ananse, the Spider man wanted to buy the Sky God's stories. So he spun a web up to the sky, and he climbed up through the clouds to see the Sky God.
When the Sky God heard what Ananse wanted, he laughed; "Twe, twe, twe. The price of my stories is that you bring me Osebo the leopard of-the-terrible teeth, Mmboro the hornet who-stings-like-fire, and Mmoatia the fairy whom-men-never-see."

Anase bowed and answered: "I shall gladly pay the price."

"Twe, twe, twe," chuckled the Sky God. "How can a weak old man like you, so small, so small, so small, pay my price?"

But Ananse merely climbed down to earth to find the things that the Sky God demanded.

Ananse ran along the jungle path-yiridi, yiridi, yiridi- till he came to Osebo the leopard -of-the-terrible-teeth.

"Oho, Ananse," said the leopard, "you are just in time to be my lunch."

Ananse replied:"As for that, what will happen will happen. But first let us play the binding binding game."

The leopard who was fond of games asked:"How is it played?"

"With vine creepers," explained Ananse. "I will bind you by your foot and foot. Then I will untie you, and you can tie me up."

"Very well," growled the leopard, who planned to eat Ananse as soon as it was his turn to bind him.

So Ananse tied the leopard by his foot, by his foot, by his foot, by his foot, with the vine creeper. Then he said:"Now, Osebo, you are ready to meet the Sky God." And he hung the tied leopard in a tree in the jungle.

Next Ananse cut a frond from a banana tree and filled a calabash with water. He crept through the tall grasses, sora, sora, sora, till he came to the nest of Mmboro, the hornets-who-sting-like-fire.

Ananse held the banana leaf over his head as an umbrella. Then he poured some of the water in the calabash over his head. The rest he emptied over the hornet's nest and cried:"It is raining, raining, raining. Should you not fly into my calabash, so that the rain will not tatter your wings?"

"Thank you, thank you," hummed the hornets, and they flew into the calabash-fom: Ananse quickly stopped the mouth of the gourd.

"Now, Mmbora you are ready to meet the Sky God," said Ananse. And he hung the calabash full of hornets onto the tree next to the leopard.

Ananse now carved a little wooden doll holding a bowl. He covered the doll from top to bottom with sticky latex gum. Then he filled the doll's bowl with pounded yams. He set the little doll at the foot of a flamboyant tree where fairies like to dance. Ananse tied one end of a vine round the doll's head and, holding the other in his hand, he hid behind a bush.

In a little while, Mmoatia the fairy-whom-no-man-sees came dancing, dancing, dancing to the foot of the flamboyant tree. There she saw the doll holding the bowl of yams.

Mmoatia said: "Gum baby, I am hungry. May I eat some of your yams?"

Ananse pulled at the vine in his hiding place, so that the doll seemed to nod its head. So the fairy took the bowl from the doll and ate all the yams.

"Thank you, Gum Baby," said the fairy. But the doll did not answer.

"Don't you reply when I thank you?" cried the angered fairy.

The doll did not stir.

"Gum baby, I'll slap your crying place unless you answer me," shouted the fairy, But the wooden doll remained silent. So the fairy slapped her crying place-pa! Her hand stuck fast to the gum baby's sticky cheek.

"Let go of my hand, or I'll slap you again."-Pa! She slapped the doll's crying place with the other hand. Now the fairy was stuck to the gum baby with both hands, and she was furious. She pushed against the doll with her feet, and they also stuck fast.

Now, Ananse came out of hiding. "You are ready to meet the Sky God, Mmoatia." And he carried her to the tree where the leopard and the hornets were waiting.

Ananse spun a web round Osebo, Mmboro, and Mmoatia. Then he spun a web to the sky. He pulled his captives behind him, and set them down at the feet of the Sky God.

"Oh, Nyame," said Ananse, bowing low, "here is the price you asked for your stories: Osebo the leopard-of-the-terrible-teeth, Mmboro the hornets-who-sting-like-fire, and Mmoatia the fairy-whom-men-never-see."

Nyame the Sky God called together all the nobles of his court and addressed them in a loud voice: "Little Ananse, the spider man, has paid me the price I asked for my stories. Sing his praise, I command you.

"Eeeee, Eeeee," shouted all the nobles.

"From this day and going on forever," proclaimed the Sky God, "my stories belong to Ananse and shall be called "Spider Stories"."

(Story ends here for Imagination Study.)

So Ananse took the golden box of stories back to earth, to the people of his village. And when he opened the box all the stories scattered to the corners of the world, including this one.

This is my story which I have related. If it be sweet or if it be not sweet take some elsewhere, and let some come back to me.

Appendix 3

Scoring Manual for Imagination Study

Part I The first six items (part 1) on the scoring sheet form a six-number subject code, which must be entered on the bottom of the sheet after the heading Subject Code: _ _ _ _ _ _.

The six items have been coded as follows:

Item 1 Sex: Female (1)
Male (2)

Item 2 School: Schools are coded according to the order in which they were visited (1), (2), or (3).

Item 3 Age: Grades 1 and 2 are coded (1)
Grades 3 and 4 are coded (2)

Item 4 Media: Radio (Audio) is coded (1)
T.V. (Video) is coded (2)

Item 5 Story: "A Story, A Story" is coded (1)
"Strega Nona" is coded (2)

Item 6 Interview: Each child was interviewed twice and is coded (1) for the first interview and (2) for the second.

Part 2

Item 7 Number of words: Includes the total number of words that make up the story. All words, including false starts, repetitions, imitative and sound words, are counted. Words like "eh" or "um" are counted only when they are part of dialogue or represent imitative sounds. Do not count conversation with the experimenter nor endings such as: that's all, this is the end, I can't think of anything else.

Item 8 Number of story repetition words: Story repetition words are the total number of words which repeat the general plot, events, or other parts of the original treatment story to which the child has been exposed. Because story repetition is non-original and non-imaginative it is counted only in item 7 and 8.

Story repetition must be distinguished from story recapitulation, which are words or sentences drawn from the original story but used as springboards to further imaginative events. Recapitulations are lead-ins, whereas repetitions are merely stalling or marking time--nothing comes of it. Story recapitulations neither add to nor subtract from imaginagiveness of story telling. Story recapitulation is simply bracketed, marked "recap", and only counted as total number of words (7).

Examples:

(A) When the lady left again to visit her friend, Anthony sang the song
(B) The pasta started bubbling and the pot started overflowing
(C) Then the spagetty wrapped around him and pulled him into a strange world...

In the above examples, sentences A and B are recapitulations because they lead into a story about the boy's adventures in a strange world (sentence C). However, had sentence C continued on with the original plot of pasta covering the town and endangering people, then sentences A and B and C would have to be counted as number of story repetition words (Item 8).

Prior to scoring for imaginative content, the experimenter (who presumably has a thorough knowledge of the content of the original treatment stories) should read through the children's continuation stories and bracket and label story repetition and story recapitulation. Additionally, the experimenter should cross out those words and word fragments which will not be counted in the total number of words (7).

Below are two stories which illustrate rules for scoring story repetition, recapitulation, and endings.

Example 1:

(She's gonne go to her aunt)^{recap}
and the clay pot will keep rolling into the land
(all the people got some plates and forks and...
napkins...and he sat on the pot)^{rep}
(They were gonne get some door and stuff...)^{rep}
people were running to catch it
but they could not because it was too far away from'm
~~that's all I can think of~~

Item (7) - Total number of words: 58
(Including recapitulations and repetitions, but excluding ending)

Item (8) - Total number of repetition words: 24

Example 2:

(He put all the stories that he got with the rest into his web and pull them up to the god)^{rep}
(and the box will be up in the sun and the sun will be turning around)^{rep}
(and all the people will be saying "yeah")^{rep}

Item (7) - Total number of words: 45
Item (8) - Total number of repetition words: 45

Item 9 Imaginative events: Any proposition that introduces elements not present in the original treatment story. Sentences constructed with coordinating, subordinating, and connecting words such as "and", "or", "because", "but", should be counted as more than one imaginary event.

Examples of imaginary events as they typically occur in the sentence structure found in the children's stories include the following:

She could use the pasta and sell it.(Scored as two imaginary events.)
She could use the pasta for dinner. (Scored as one imaginary event.)
She told everyone but they would not believe her. (Scored as two imaginary events.)
She told everyone but Anthony. (Scored as one imaginary event.)
She was angry with him because she told him not to touch it. (Scored as two imaginary events.)
He don't have any money so he couldn't buy the house. (Scored as two imaginary events.)
She told him not to feed the goat so much food. (Scored as one imaginary event.)

Item 10 Vague characters: Include newly introduced and undifferentiated human and animal personalities and groups of people and animals. Examples: Somebody, someone else, the man, the child, the animal, etc.

The following imaginary events contain vague characters:

He might sell them to somebody else
He read stories to his children
The animals ran free in the forest
She needed a maid to do the work

Sentences such as "He took the stories down to the people," and "Everybody starts making more stories," do not include vague characters because "the people" and "everybody" are not newly introduced, but refer back to characters who appear in the original treatment story. Therefore, "everybody", "they", "the people" are not counted.

(Note that when used repeatedly, the newly introduced vague character should be counted only once in each story)

Item 11 Specific characters: Include newly introduced and differentiated human and animal personalities and groups of people and humans. Vague characters that have a modifying adjective also fall in this category.

The following imaginative events each include a specific character:

The greedy boy flew up in the air
She changed him into a frog
He gave all of his stories to his best friend
They wanted him to become a crime-fighter

However, the sentence "Strega Nona, the witch, knew lots of magic," includes two specific characters which are not newly introduced and therefore should not be counted.

(Note that when used repeatedly, the newly introduced vague character should be counted only once in each story)

Item 12 Direct dialogue: Includes any newly introduced sentence which involves dialogue in quotation marks. The following imaginary events are counted as direct dialogue:

The witch says: "Now you've gotto clean up this whole mess."
The old man says: "I'll build this village for you if you turn me young again."

Item 13 Indirect dialogue: Includes any newly introduced sentence which involves dialogue without quotation marks. The following imaginary events are examples of indirect dialogue:

Strega Nona would ask Anthony why he'd done that to the pot
They thank the lady for saving their town
She's gonne tell the guy to get lost

Item 14 Feeling states: Only emotions should be classified as a feeling state item.

In the following examples we have two imaginary events but only one feeling state: "She shouted at him and that hurt his feelings." However, physical states such as "He'd hurt his knee," or "He is hungry," although imaginary events, are not counted as feeling states.

Examples of feeling states include:

She was very happy
The town would like his stories
The witch got real angry with Anthony

Item 15 Time setting: Includes any story segments which depict discrete time periods within which the story takes place.

The following imaginary events contain time settings:

Someday soon he'll come back home again
The stories will be passed on in generations
He had to stay in the dungeon forever

However, the sentence "If she got tired of the pot she could sell it," is a conditional clause without specific reference to time, and is not counted as containing a time setting.

Item 16 Location setting: Includes any story segments which depict discrete locations within which the story takes place.

The following imaginary events contain examples of locations:

It drew him into a strange world
They put them up somewhere like in City Hall or something
She might put the pot in a special place where no-one knows

(Note that locations should be counted only the first time they are introduced in the story.)

Item 17 Imaginary events/other items: This item includes imaginary events which contain within them one or more other items.

Examples:

The imaginative event "he made him into a young man," is counted under item 11 (specific character), item 9 (imaginary event) and item 17 (imaginary event/ other items). However, "He made him young again," is counted only as an imaginary event.

Additional examples:

A) And then the sky god got kind of angry.
B) They were in this little hide-away.
C) They can't eat when its dinnertime.

Imaginative event A includes a feeling state (item 14), B includes a location setting (item 16), and C includes a time setting (item 15), and all three are counted in item 17.

Appendix 4

INFERENCE QUESTIONS

Inference Questions for A Story, A Story:

1. Character-affect:
   How did the Sky God feel when Ananse returned with the leopard, the hornets and the fairy?
2. Character-affect:
   How did Ananse feel after he had caught the hornets?
3. Character-evaluation:
   Was Ananse kind or mean?
4. Character-intention:
   Why did Ananse want to buy the stories?
5. Character-attribute (mental):
   Was Ananse smart or dumb?
6. Qualitative feature of action:
   Was spinning the web an easy job or a hard job?
7. Inference of distance:
   How far away did Ananse hide from the fairy?
8. Character-affect:
   How did the village people feel when Ananse brought the stories back to them?

The answer to each question will be followed by "How do you know?" or "How can you tell?" as in Meringoff (1978).

Inference Questions for Strega Nona:

1. Character-affect:
   How did Big Anthony feel when he told the people about the pasta pot and they laughed at him?
2. Character-affect:
   How did Big Anthony feel when the pasta pot wouldn't stop?
3. Character-evaluation:
   Was Strega Nona kind or mean?
4. Character-intention:
   Why did Big Anthony use the pasta pot?
5. Character-attribute (mental):
   Was Big Anthony smart or dumb?
6. Qualitative feature of action:
   Was stopping the magic pasta pot an easy job or a hard job?
7. Inference of distance:
   How far did Strega Nona live from the center of town?
8. Character-affect:
   How did the people feel after Big Anthony fed them?

The answer to each question will be following by "How do you know?" or "How can you tell?", as in Meringoff (1978).

Detail Questions for A Story, A Story

The first four questions were designed to assess auditorily presented information only. The last three questions were designed to assess audiovisual information.

Ananse made a special sound while hunting for the leopard. Here are the two different sounds. Listen carefully and then tell me which one you think he made.

1) yidiri, yidiri, yidiri

   Was this the one?

2) yiridi, yiridi, yiridi

   Was this the one?

Here are two different things Ananse might have told the leopard about the game before they played it. Listen carefully and then tell me which one you think he really said.

1) But first let us play the binding, binding game.

   Was this the one?

2) But first let us play the winding, winding game.

   Was this the one?

Ananse made a special sound when he crept through the tall grasses on his way to the hornets. Here are two different sounds. Listen carefully and then tell me which one you think he really made.

1) sola, sola, sola

2) sora, sora, sora

What does Ananse mean?

Did Ananse first pour water over the hornets or himself?

Did Ananse cover the doll with latex gum from

1) top to bottom

or 2) bottom to top

What color box did the Sky God keep the stories in?

Detail Questions for Strega Nona

The first four questions were designed to assess auditorily presented information only. The last three questions were designed to assess audiovisual information.

What does Strega Nona mean?

Strega Nona sang a special song to start the pasta pot. Listen carefully to these two different songs and then tell me which one you think she really sang.

1) Boil, boil pasta pot/Bubble up some pasta, nice and hot.

   Was this the one?

2) Bubble, bubble pasta pot/Boil me up some pasta, nice and hot.

   Was this the one?

Strega Nona sang a special song to stop the pasta pot. Listen carefully to these two different songs and then tell me which one you think she really sang.

1) Enough, enough, my pot of clay/Until I'm hungry for another day

2) Until I'm hungry, my pot of clay/Stop, stop until another day

Big Anthony told the people what to bring to Strega Nona's house. Listen carefully to these two things and then tell me which one you think he really said.

1) cups and saucers and knives and forks.

   Was this the one?

2) plates and forks and platters and bowls.

   Was this the one?

Did Strega Nona have a cow, a cat or a goat?

How could Strega Nona cure a headache?

Why did Big Anthony go to town after he saw Strega Nona use the pasta pot?

Appendix 6

AIDED RECALL QUESTIONS

Aided recall questions for Strega Nona

What could Strega Nona cure?

After Strega Nona went to town and put up the sign, who came for the job?

Why did Strega Nona go to town at the beginning of the story?

What did Strega Nona tell Big Anthony he had to do?
(probe: What did Big Anthony have to do for his job?)

What did Strega Nona do with the magic pasta pot?
(probe: What did she say to the pot?)

What did Big Anthony do when he was in town?

Then, what did Strega Nona tell Big Anthony before she left home?
(probe: What was Big Anthony supposed to do while Strega Nona was gone?)

What did Big Anthony do as soon as Strega Nona was gone?

What did Big Anthony do after he started the pot?
(probe: Where did he go and what did he say?)

What happened after Big Anthony told the people that he made the pot work?

After the people came to Strega Nona's house, then what did Big Anthony do?

Then, after the people were fed, what happened with the pasta pot?

How did Big Anthony try to stop the pot?
(probe: What did Big Anthony say to the pasta pot?)

When the pasta kept coming, what did the poeple do?

What did Strega Nona do first when she returned?
(probe: How did she stop the pot?)

What happened after Strega Nona stopped the pasta pot?
(probe: What did she tell Big Anthony?)

What did Big Anthony do at the end?

Aided recall questions for A Story, A Story

Why weren't there any stories on earth?
(probe: Who had all the stories?)

Where did Ananse go first?
(probe: How did he get there?)

When Ananse reached the Sky God, what did the Sky God say to him?
(probe: What was the price of the stories?)

How did Ananse find the leopard?

How did Anase catch the leopard?
(probe: How was the game played with the leopard?)

What did Ananse say to the leopard when he hung the leopard in a tree?

What did Ananse look for next?

How did Ananse catch the hornets?
(probe: Where did he pour water?)

Then, what did Ananse do to the hornets?

Who did Ananse catch last?

How did Ananse catch the fairy?

What did Ananse do with the doll?
(probe: How did the doll nod her head?)

What happened when the fairy came?

What did the fairy say to the doll after one of her hands was stuck to the doll?

Then, what did Ananse do after he had caught the fairy?
(probe: Where did he take the creatures he had captured?)

What happened when Ananse returned to the Sky God?
(probe: What did Ananse say to the Sky God?)

What happened after Ananse got the box of stories?

Appendix 7

ORDER OF QUESTIONS

Actual Order of Questions for Strega Nona

What does Strega Nona mean?

What could Strega Nona cure?

How could Strega Nona cure a headache?

Why did Strega Nona go to town at the beginning of the story?

After Strega Nona went to town and put up the sign, who came for the job?

What did Strega Nona tell Big Anthony he had to do?
(probe: What did Big Anthony have to do for his job?)

Did Strega Nona have a cow, a cat or a goat?

What did Strega Nona do with the magic pasta pot?
(probe: What did she say to the pot?)

Strega Nona sang a special song to start the pasta pot. Listen carefully to these two different songs and then tell me which one you think she really sang.

1) Boil, boil pasta pot/Bubble up some pasta, nice and hot.
Was this the one?

2) Bubble, bubble pasta pot/Boil me up some pasta, nice and hot.
Was this the one?

Was stopping the pasta pot an easy job or a hard job?
How do you know it was _____?

Strega Nona sang a special song to stop the pasta pot. Listen carefully to these two different songs and then tell me which one you think she really sang.

1) Enough, enough my pot of clay/until I'm hungry for another day.
Was this the one?

2) Until I'm hungry, my pot of clay/Stop, stop until another day.
Was this the one?

What did Big Anthony go to town after he saw Strega Nona use the pasta pot?

What did Big Anthony do when he was in town?

When Big Anthony told the people about the pasta pot, they laughed at him. How did he feel when they laughed at him?
How do you know he felt _____?

Then what did Strega Nona tell Big Anthony before she left home?
(probe: What was Big Anthony supposed to do while Strega Nona was gone?)

What did Big Anthony do as soon as Strega Nona was gone?

What did Big Anthony use the pasta pot?
How do you know _____?

What did Big Anthony do after he started the pot?
(probe: Where did he go and what did he say?)

What happened after Big Anthony told the people that he made the pot work?

Big Anthony told the people what to bring to Strega Nona's house. Listen carefully to these two things and then tell me which one you think he really said.

1) cups and saucers and knives and forks.
Was this the one?

2) plates and forks and platters and bowls.
Was this the one?

After the people came to Strega Nona's house, then what did Big Anthony do?

How did the people feel after Big Anthony fed them?
How do you know they felt _____?

Then, after the people were fed, what happened with the pasta pot?

How did Big Anthony try to stop the pot?
(probe: What did Big Anthony say to the pasta pot?)

How did Big Anthony feel when the pasta pot wouldn't stop?
How do you know he felt _____?

When the pasta kept coming, what did the people do?

How did Strega Nona feel when she returned and saw all of the pasta?
How do you know she felt _____?

What did Strega Nona do first when she returned?
(probe: How did she stop the pot?)

What happened after Strega Nona stopped the magic pasta pot?
(probe: What did she tell Big Anthony?)

What did Big Anthony do at the end?

How far did Strega Nona live from the center of town?
How do you know it was _____?

Was Strega Nona kind or mean?
How do you know she was _____?

Was Big Anthony smart or dumb?
How do you know he was _____?

Actual Order of Questions for A Story, A Story

What does Ananse mean?

Why weren't there any stories on earth?
(probe: Who had all the stories?)

Why did Ananse, the Spider man, want to buy the stories from the Sky God?
How do you know that _____?

Where did Ananse go first?
(probe: How did he get there?)

Was spinning the web an easy job or a hard job?
How do you know it was _____?

What color box did the Sky God keep the stories in?

When Ananse reached the Sky God, what did the Sky God say to him?
(probe: What was the price of the stories?)

How did Ananse find the leopard?

Ananse made a special sound while hunting for the leopard. Here are two different sounds. Listen carefully and then tell me which one you think he made.

1) yidiri, yidiri, yidiri
Was this the one?

2) yiridi, yiridi, yiridi
Was this the one?

How did Ananse catch the leopard?
(probe: How was the game played with the leopard?)

Here are two different things Ananse might have told the leopard about the game before they played it. Listen carefully and then tell me which one you think he really said.

1) But first let us play the binding, binding game.
   Was this the one?

2) But first let us play the winding, winding game.
   Was this the one?

What did Ananse say to the leopard when he hung the leopard in a tree?

Who did Ananse look for next?

Ananse made a special sound when he crept through the tall grasses on his way to the hornets. Here are two different sounds. Listen carefully and then tell me which one you think he really made.

1) sola sola sola

2) sora sora sora

How did Ananse catch the hornets?
(probe: Where did he pour water?)

Did Ananse first pour water over the hornets or himself?

Then, what did Ananse do to the hornets"

How did Ananse feel after he had caught the hornets?
How do you know that he felt _____?

Who did Ananse catch last?

How did Ananse catch the fairy?

What did Ananse do with the doll?
(probe: How did the doll nod her head?)

Did Ananse cover the doll with latex gum from

a) top to bottom

or b) from bottom to top

What happened when the fairy came?

What did the fairy say to the doll after one of her hands was stuck to the doll?

How far away did Ananse hide from the fairy?
How do you know it was _____?

How did the fairy feel after Ananse had caught her?
How do you know she felt _____?

Then, what did Ananse do after he had caught the fairy?
(probe: Where did he take the creatures he had captured?)

What happened when Ananse returned to the Sky God?
(probe: What did Ananse say to the Sky God?)

How did the Sky God feel when Ananse returned with the leopard, the hornets, and the fairy?
How do you know he felt _____?

What happened after Ananse got the box of stories?

How did the village people feel when Ananse brought the stories back to them?
How do you know they felt _____?

Was Ananse kind or mean?
How do you know he was _____?

Was the Sky God smart or dumb?
How do you know he was _____?